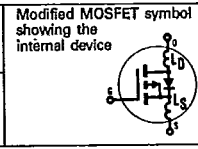


Absolute Maximum Ratings

Parameter	IRFD9020	IRFD9022	Units
V _{DS} Drain - Source Voltage ①	-50	-50	V
V _{DGR} Drain - Gate Voltage (R _{GS} = 20 K Ω) ①	-50	-50	V
I _D @ T _C = 25°C Continuous Drain Current	-1.6	-1.4	A
I _D @ T _C = 100°C Continuous Drain Current	-0.99	-1.1	A
I _{DM} Pulsed Drain Current ②	-13	-11	A
V _{GS} Gate - Source Voltage	±20		V
P _D @ T _C = 25°C Max. Power Dissipation	1		W
Linear Derating Factor	0.0080		W/K ③
I _{LM} Inductive Current, Clamped	-13 (See Fig. 14) L = 100 μ H	-11	A
I _L Unclamped Inductive Current (Avalanche Current) ③	(See Fig. 15) -2.2		A
T _J Operating Junction and Storage Temperature Range	-55 to 150		°C
T _{stg} Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)		°C

Electrical Characteristics @ T_C = 25°C (Unless Otherwise Specified)

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain - Source Breakdown Voltage	IRFD9020 IRFD9022	-50	-	-	V	V _{GS} = 0V I _D = -250 μ A
V _{GS(th)} Gate Threshold Voltage	ALL	-2.0	-	-4.0	V	V _{DS} = V _{GS} , I _D = -250 μ A
I _{GSS} Gate-Source Leakage Forward	ALL	-	-	-500	nA	V _{GS} = -20V
I _{GSS} Gate-Source Leakage Reverse	ALL	-	-	500	nA	V _{GS} = 20V
I _{DSS} Zero Gate Voltage Drain Current	ALL	-	-	-250	μ A	V _{DS} = Max. Rating, V _{GS} = 0V
I _{D(on)} On-State Drain Current ④	IRFD9020 IRFD9022	-1.6 -1.4	-	-	A	V _{DS} > I _{D(on)} × R _{DSON(max)} , V _{GS} = -10V
R _{DSON} Static Drain-Source On-State Resistance ④	IRFD9020 IRFD9022	-	0.20 0.28	0.28 0.33	Ω	V _{GS} = -10V, I _D = -1.1A
g _{fs} Forward Transconductance ④	ALL	1.3	1.4	-	S(O)	V _{DS} = 2 × V _{GS} , I _{DS} = -1.1A
C _{iss} Input Capacitance	ALL	-	480	-	pF	V _{GS} = 0V, V _{DS} = -25V, f = 1.0 MHz
C _{oss} Output Capacitance	ALL	-	320	-	pF	See Fig. 10
C _{rss} Reverse Transfer Capacitance	ALL	-	58	-	pF	
t _{d(on)} Turn-On Delay Time	ALL	-	8.2	12	ns	V _{DD} = -25V, I _D = -9.7A, R _G = 18 Ω , R _D = 2.4 Ω
t _r Rise Time	ALL	-	57	86	ns	See Fig. 16
t _{d(off)} Turn-Off Delay Time	ALL	-	12	18	ns	(MOSFET switching times are essentially independent of operating temperature.)
t _f Fall Time	ALL	-	25	38	ns	
Q _g Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	-	17	26	nC	V _{GS} = -10V, I _D = -9.7A, V _{DS} = 0.8 Max. Rating. See Fig. 17 for test circuit. (Gate charge is essentially independent of operating temperature.)
Q _{gs} Gate-Source Charge	ALL	-	4.1	6.2	nC	
Q _{gd} Gate-Drain ("Miller") Charge	ALL	-	5.7	8.6	nC	
L _D Internal Drain Inductance	ALL	-	4.0	-	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die.
L _S Internal Source Inductance	ALL	-	6.0	-	nH	Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.



Thermal Resistance

R _{thJA} Junction-to-Ambient	ALL	-	-	120	K/W ⑤	Typical socket mount
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Source-Drain Diode Ratings and Characteristics

I_S	Continuous Source Current (Body Diode)	IRFD9020	-	-	-1.6	A	Modified MOSFET symbol showing the integral reverse PN junction rectifier.
		IRFD9022	-	-	-1.4	A	
I_{SM}	Pulse Source Current (Body Diode) ③	IRFD9020	-	-	-13	A	
		IRFD9022	-	-	-11	A	
V_{SD}	Diode Forward Voltage ②	ALL	-	-	-6.3	V	$T_C = 25^\circ\text{C}, I_S = -1.6\text{A}, V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery Time	ALL	56	110	280	ns	$T_J = 25^\circ\text{C}, I_F = -9.7\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$
Q_{RR}	Reverse Recovered Charge	ALL	0.17	0.34	0.85	μC	$T_J = 25^\circ\text{C}, I_F = -9.7\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$
t_{on}	Forward Turn-on Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				



① $T_J = 25^\circ\text{C}$ to 150°C ② Repetitive Rating: Pulse width limited by max. junction temperature. See Transient Thermal Impedance Curve (Fig. 5).
 ③ $V_{dd} = -25\text{V}, T_J = 25^\circ\text{C}$ ④ Pulse Test: Pulse width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$
 ⑤ $K/W = ^\circ\text{C}/\text{W}$ $L = 100 \mu\text{H}, R_G = 25\Omega$

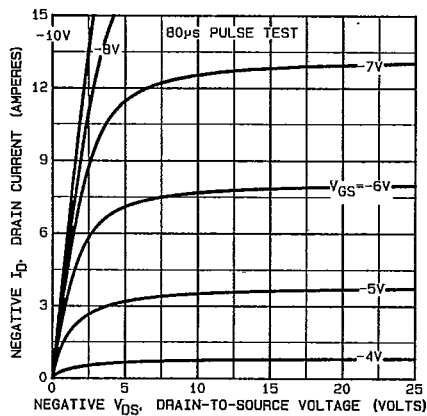


Fig. 1 — Typical Output Characteristics

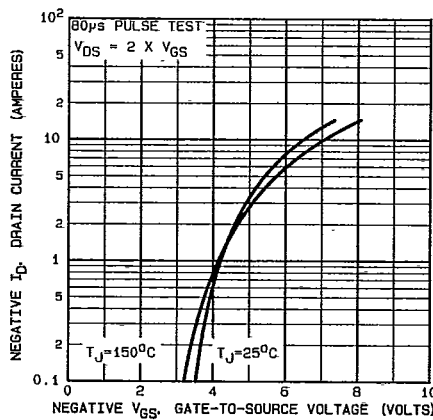


Fig. 2 — Typical Transfer Characteristics

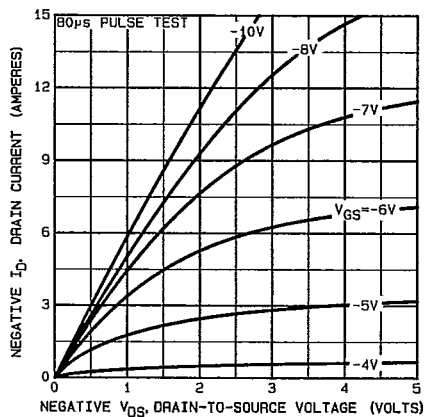


Fig. 3 — Typical Saturation Characteristics

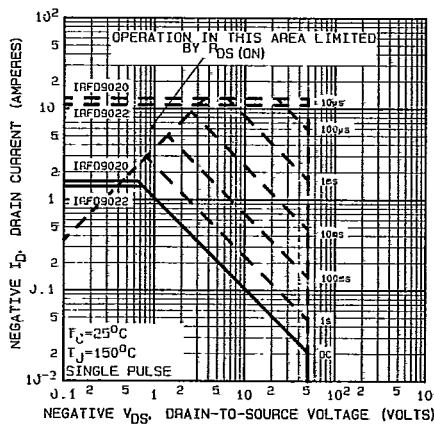
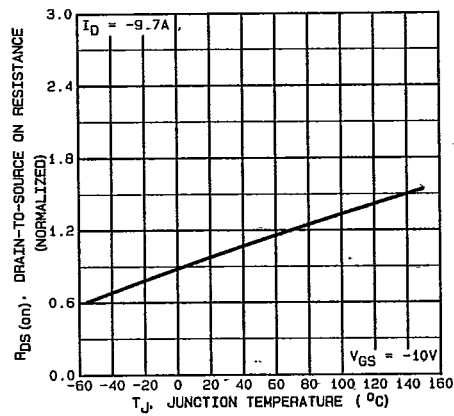
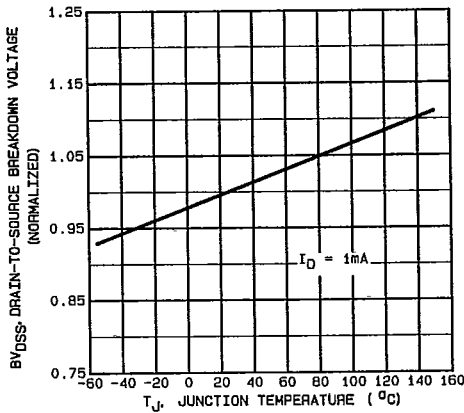
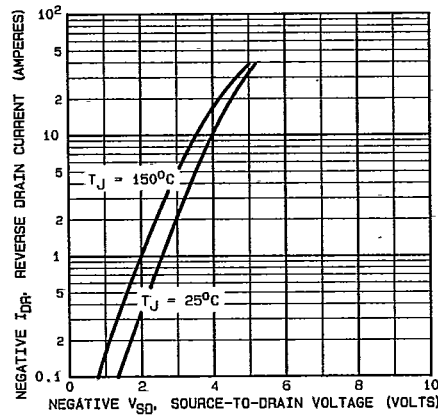
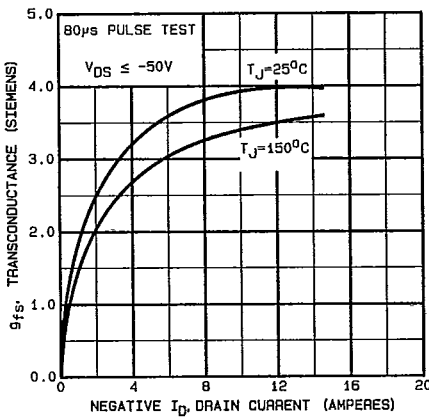
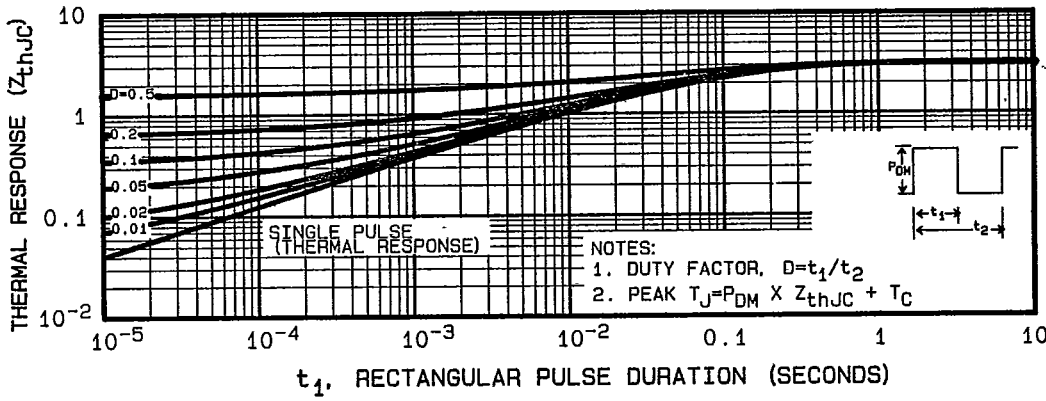


Fig. 4 — Maximum Safe Operating Area





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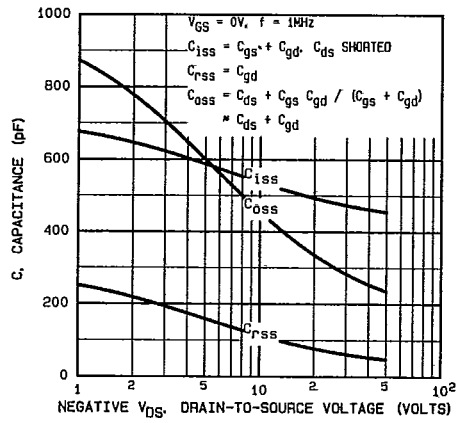


Fig. 10 — Typical Capacitance Vs. Drain-to-Source Voltage

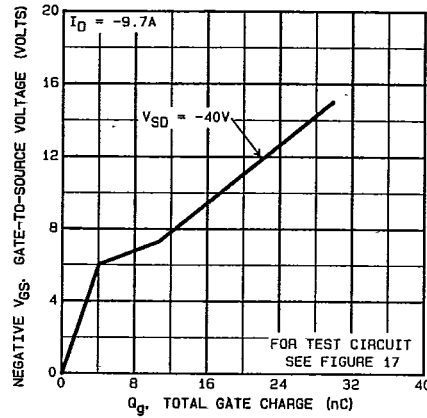


Fig. 11 — Typical Gate Charge Vs. Gate-to-Source Voltage

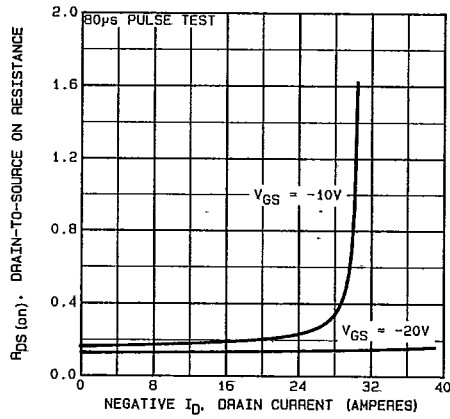


Fig. 12 — Typical On-Resistance Vs. Drain Current

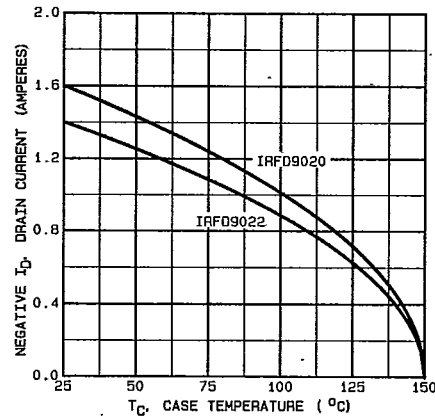


Fig. 13 — Maximum Drain Current Vs. Case Temperature

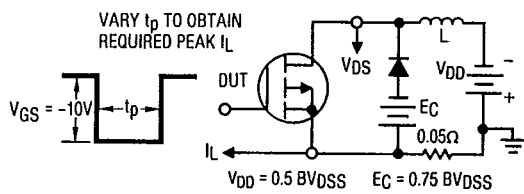


Fig. 14a — Clamped Inductive Test Circuit

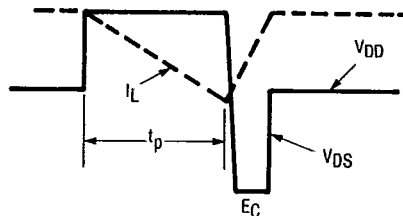


Fig. 14b — Clamped Inductive Waveforms

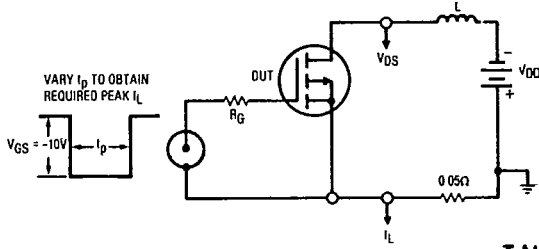


Fig. 15a — Unclamped Inductive Test Circuit

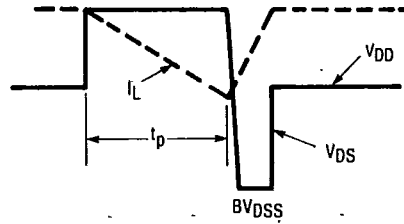


Fig. 15b — Unclamped Inductive Load Test Waveforms

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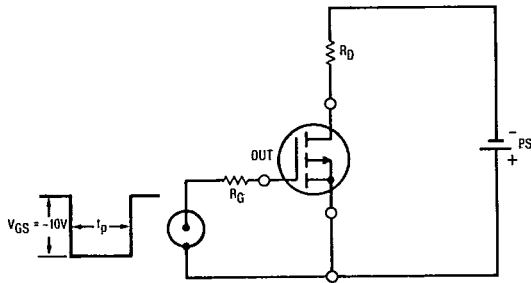


Fig. 16 — Switching Time Test Circuit

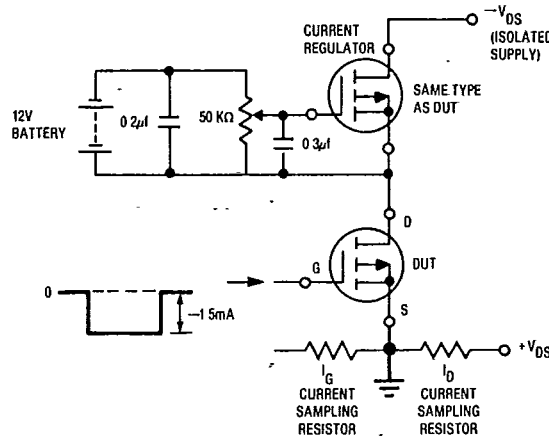
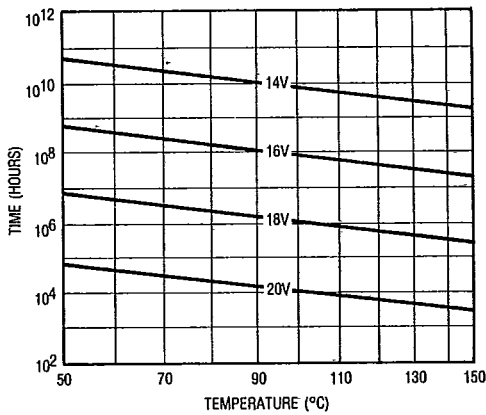
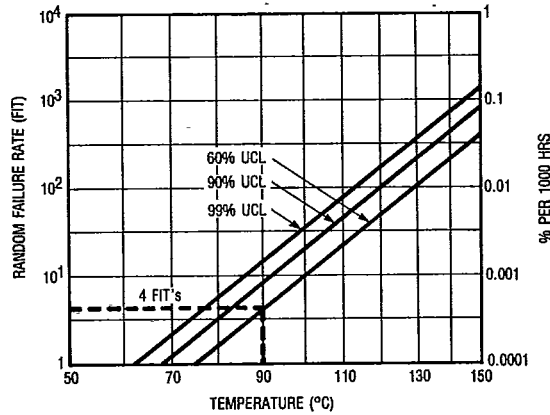


Fig. 17 — Gate Charge Test Circuit



*Fig. 18 — Typical Time to Accumulated 1% Gate Failure



*Fig. 19 — Typical High Temperature Reverse Bias (HTRB) Failure Rate

*The data shown is correct as of April 15, 1987. This information is updated on a quarterly basis; for the latest reliability data, please contact your local IR field office.

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